

3-2607

SCIENCE NOTEBOOK #71

JANUARY 8, 1976

1. MAN ALTERS CLIMATE (DOSA)
2. X-RAYS REVEAL DRUG ABUSE (RICHARDS)
3. AIR-TO-SEA POLLUTION (SPLANE/MIAMI)
4. WINTER SHIPPING ON THE GREAT LAKES (RICHARDS)
5. PIONEER HEADED FOR SATURN (DOSA)

ANNCR: THE VOICE OF AMERICA PRESENTS...SCIENCE NOTEBOOK...A SUMMARY OF EVENTS IN SCIENCE, MEDICINE AND TECHNOLOGY. EACH WEEK AT THIS TIME, WE BRING YOU REPORTS ON DEVELOPMENTS THAT MAY AFFECT OUR DAILY LIVES. WITH THE FIRST STORY, HERE IS YOUR SCIENCE EDITOR \_\_\_\_\_:

(MAN ALTERS CLIMATE -- 3-2607 -- DOSA)

EDITOR: REMOVAL OF THE TROPICAL RAIN FORESTS WOULD LEAD TO GLOBAL CHANGES IN THE CLIMATE, ACCORDING TO A COMPUTER STUDY PERFORMED BY A GROUP OF AMERICAN SCIENTISTS.

\_\_\_\_\_ HAS THE STORY.

VOICE: THE STUDY WAS CARRIED OUT BY ATMOSPHERIC SCIENTISTS AT THE U-S ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION'S LAWRENCE LIVERMORE LABORATORY IN CALIFORNIA. IN AN EFFORT TO FIND OUT WHETHER MAN CAN REALLY ALTER WORLD-WIDE CLIMATE THROUGH HIS REGIONAL ACTIVITIES, THE RESEARCHERS INSTRUCTED THEIR COMPUTER TO CALCULATE THE POSSIBLE EFFECTS ON GLOBAL CLIMATE OF LARGE-SCALE DEFORESTATION OF THE TROPICS.

THE RESULTS SHOWED THAT TEMPERATURES THROUGHOUT THE WORLD WOULD GO DOWN BY AN AVERAGE OF TWO-TENTHS OF A DEGREE CELSIUS AND RAINFALL WOULD DECREASE BY MORE THAN TWO-HUNDRED MILLIMETERS PER YEAR AT THE EQUATOR AND BY TEN-TO-TWENTY MILLIMETERS IN THE NORTH TEMPERATE ZONE.

VOICE: THESE CLIMATIC CHANGES WOULD COME ABOUT BECAUSE OF THE  
(CONT) INCREASED REFLECTION OF SUNLIGHT BACK INTO SPACE. TODAY,  
THE TROPICAL FORESTS ABSORB MUCH OF THE SUNLIGHT BUT  
IF THE VEGETATION WERE REMOVED, THE SUNLIGHT WOULD BE  
REFLECTED BY THE BARE EARTH.

THE COMPUTER STUDY SUGGESTS THAT INCREASED REFLECTIVITY  
WOULD RESULT IN LOWER TEMPERATURES, WITH LESS EVAPORATION  
AND RAINFALL NEAR THE EQUATOR. THIS, IN TURN, WOULD  
ADVERSELY AFFECT THE CIRCULATION OF MASSIVE AIR CURRENTS  
WHICH CARRY WARMTH AND MOISTURE TO THE HIGHER LATITUDES  
IN BOTH THE NORTHERN AND SOUTHERN HALVES OF THE GLOBE.

THE LIVERMORE SCIENTISTS, REPORTING ON THEIR STUDY IN THE  
BRITISH JOURNAL "NATURE," CAUTION THAT COMPUTER  
SIMULATION OF ATMOSPHERIC CONDITIONS IS NOT NECESSARILY  
INFALLIBLE. THEY SAY THEIR WORK "SHOULD BE VIEWED  
PRIMARILY AS INDICATIONS OF POSSIBLE CHANGE" IN THE  
WORLD'S CLIMATE IF THE TROPICAL RAIN FORESTS WERE REMOVED.

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(X-RAYS REVEAL DRUG ABUSE -- 3-2607 -- RICHARDS)

EDITOR: X-RAYS ARE BECOMING A VALUABLE DIAGNOSTIC TOOL IN THE  
TREATMENT AND STUDY OF DRUG ABUSE. HERE IS \_\_\_\_\_ WITH A  
REPORT.

VOICE: IT CAN BE DANGEROUS TO TREAT SOMEONE SUFFERING FROM A  
DRUG OVERDOSE WITH MEDICINE MEANT TO COPE WITH A DIFFERENT  
KIND OF DRUG. BUT FINDING OUT EXACTLY WHAT AN OVERDOSE

VOICE:  
(CONT) PATIENT HAS TAKEN IS OFTEN A GUESSING GAME FOR DOCTORS,  
BECAUSE THE PATIENT IS USUALLY UNCONSCIOUS OR SEMI-  
CONSCIOUS WHEN BROUGHT INTO THE HOSPITAL.

DOCTORS HAVE BEGUN USING X-RAYS TO SOLVE THIS PROBLEM AND TO  
STUDY THE EFFECTS OF CHRONIC DRUG ABUSE ON THE BODY.  
A SIMPLE CHEST X-RAY FOR EXAMPLE, CAN TELL A DOCTOR WHETHER  
A PATIENT IS SUFFERING FROM A HEROIN OVERDOSE. THIS IS  
IMPORTANT BECAUSE THE TREATMENT FOR HEROIN OR METHADONE  
OVERDOSE CAN BE DANGEROUS TO THE PERSON WHO HAS TAKEN TOO  
MANY BARBITURATES OR TOO MUCH COCAINE.

DOCTORS CAN QUICKLY SPOT THE HEROIN OR METHADONE USER WITH  
X-RAYS BECAUSE THESE PATIENTS DEVELOP PULMONARY EDEMA OR  
FLUID IN THE LUNG. THIS BUILDUP OF FLUID DOES NOT DEVELOP  
IN PATIENTS WHO HAVE TAKEN AN OVERDOSE OF AMPHETAMINES OR  
BARBITURATES.

DOCTORS ARE ALSO USING X-RAYS TO STUDY OTHER EFFECTS OF  
CHRONIC DRUG ABUSE. FOR EXAMPLE, THEY CAN SPOT DECREASED  
BLOOD FLOW TO THE BRAIN CAUSED BY THE TAKING OF AMPHETAMINES.  
THEY ALSO CAN FIND BLOOD CLOTS IN THE LUNGS AND DEGENERATIVE  
INFECTION OF THE BONES DUE TO HEROIN ADDICTION.

BECAUSE THE DRUG ADDICT IS OFTEN UNABLE TO CORRECTLY DESCRIBE  
WHAT DRUGS HE HAS TAKEN AND IN WHAT AMOUNT, DOCTORS HAVE  
ALSO TURNED TO ANIMAL EXPERIMENTATION FOR MORE ACCURATE  
DATA. AND THEY HAVE FOUND X-RAYS TO BE AN IMPORTANT TOOL IN  
THEIR STUDIES.

VOICE: DOCTOR CALVIN RUMBAUGH, A PROFESSOR OF RADIOLOGY AND  
(CO NT) NEUROLOGY AT THE UNIVERSITY OF SOUTHERN CALIFORNIA SCHOOL OF MEDICINE, TOLD A SCIENTIFIC MEETING OF A STUDY HE CONDUCTED TO TEST THE EFFECTS OF METHAMPHETAMINES, POPULARLY CALLED "SPEED," ON THE BRAIN.

FIVE RHESUS MONKEYS WERE GIVEN AMPHETAMINES FOR TWO WEEKS IN DOSES THAT WERE EQUIVALENT TO FIFTY AND ONE-HUNDRED MILLIGRAM DOSES TAKEN BY A HUMAN BEING. MOST DRUG USERS, ACCORDING TO DOCTOR RUMBAUGH, TAKE EVEN LARGER DOSES OF THE DRUG.

THE SCIENTISTS NOTICED MARKED CHANGES IN THE PERSONAL HYGIENE AND BEHAVIOR OF THE ANIMALS, BUT THEY ALSO FOUND SEVERE PHYSIOLOGICAL CHANGES AS REVEALED THROUGH THE USE OF X-RAYS.

AFTER THE ANIMALS HAD TAKEN THE AMPHETAMINES FOR A WEEK, THE X-RAYS SHOWED A GENERAL DECREASE IN THE SIZE OF SMALL BRANCHES AND MAJOR ARTERIES OF THE BRAIN IN TWO OF THE ANIMALS.

AND AT THE END OF THE TWO WEEK EXPERIMENT X-RAYS SHOWED SEVERE DAMAGE TO THE BRAIN IN ALL ANIMALS. THE DOCTORS CONCLUDED THAT MANY OF THE BRAIN CHANGES COULD NOT BE REVERSED. AND THEY SAID THEY WERE SURPRISED THAT THE ANIMALS FUNCTIONED AS WELL AS THEY DID AT THE END OF THE EXPERIMENT.

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(AIR-TO-SEA POLLUTION -- 3-2607 -- SPLANE/MIAMI)

EDITOR: FORTY-SIX SCIENTISTS FROM ELEVEN NATIONS RECENTLY CONCLUDED A ONE-WEEK WORKSHOP IN MIAMI, FLORIDA TO STUDY THE PROBLEM OF ATMOSPHERIC POLLUTION OF THE OCEAN. OR TO PUT IT MORE ACCURATELY, THEY MET TO PONDER THE QUESTION OF WHETHER THERE IS SUCH A PROBLEM. VOA CORRESPONDENT RUSSEL SPLANE HAS A REPORT FROM MIAMI:

VOICE: THE SCIENTISTS GATHERED AT THE ROSENSTIEL SCHOOL OF MARINE AND ATMOSPHERIC SCIENCE OF THE UNIVERSITY OF MIAMI. THEY CAME FROM AUSTRALIA, BELGIUM, CANADA, THE FEDERAL REPUBLIC OF GERMANY, FRANCE, GREAT BRITAIN, INDIA, ITALY, JAPAN, THE SOVIET UNION AND THE UNITED STATES. [ THEIR MISSION WAS TO ASSESS CURRENT KNOWLEDGE OF POTENTIAL PROBLEMS IN OCEAN POLLUTION -- SUCH THINGS AS AIR-TO-SEA TRANSFER OF HEAVY METALS, HALOGENATED HYDROCARBONS, PETROLEUM HYDROCARBONS AND OTHER TRACE POLLUTANTS. ONCE THE PROBLEM AREAS ARE IDENTIFIED, THE SCIENTISTS WILL MAKE RECOMMENDATIONS AS TO WHERE FUTURE RESEARCH IS, OR MAY BE, NEEDED.

THERE SEEMS LITTLE QUESTION THAT THE OCEANS ARE BECOMING POLLUTED, BUT HOW MUCH OF THE POLLUTION IS BEING CARRIED TO THE SEAS THROUGH THE ATMOSPHERE? THE QUESTION WAS PUT TO DOCTOR JOSEPH PROSPERO OF THE UNIVERSITY OF MIAMI, CHAIRMAN OF THE CONFERENCE:

TAPE: CUT ONE -- PROSPERO

"WE REALLY DON'T KNOW WHETHER SOME OF THESE MATERIALS WHICH WE REGARD AS BEING POLLUTANTS IN OUR ENVIRONMENT -- THINGS LIKE LEAD, CADMIUM, MERCURY, VANADIUM -- WE REALLY DON'T KNOW IF THEY COULD HAVE ANY REAL SIGNIFICANCE IN THE MARINE ENVIRONMENT. RATHER THAN BECOME INVOLVED IN THIS PROBLEM -- WHICH WOULD TAKE YEARS TO SOLVE -- WE ARE TAKING THE FIRST STEP, THAT IS THE STEP OF TRANSPORT THRU THE ATMOSPHERE INTO THE OCEAN."

VOICE: DOCTOR PROSPERO THINKS, A HEAVILY INDUSTRIALIZED COUNTRY LIKE THE UNITED STATES DOES NOT HAVE UNIQUE ATMOSPHERIC POLLUTION PROBLEMS:

TAPE: CUT TWO -- PROSPERO

"I WOULD THINK THAT PERHAPS THE ONLY THING UNIQUE ABOUT OUR COUNTRY IS THAT IT HAS MORE OF THOSE POLLUTANTS THAN MAYBE SOME OTHER LESS INDUSTRIALIZED COUNTRIES. BUT I THINK THAT THE MATERIALS THAT WE ARE CONCERNED WITH ARE UBIQUITOUS -- THEY ARE FOUND THROUGHOUT THE WORLD. I THINK THAT AS THE NATIONS THROUGHOUT THE WORLD DEVELOP THEIR TECHNOLOGIES THAT THEY WILL ENCOUNTER THE SAME SORTS OF PROBLEMS WE ARE ENCOUNTERING NOW."

VOICE: ONE SPONSOR OF THE MIAMI WORKSHOP WAS THE U-S NATIONAL ACADEMY OF SCIENCES IN WASHINGTON, REPRESENTED AT THE GATHERING BY MISTER RICHARD VETTER WHO DISCUSSED THE INTERNATIONAL IMPORTANCE OF THE MEETING.

TAPE: CUT THREE -- VETTER

"THE MAJOR SPONSOR OF THIS CONFERENCE IS THE SCIENTIFIC COMMITTEE ON OCEANIC RESEARCH WHICH IS A NON-GOVERNMENTAL BODY OF INTERNATIONAL SCIENTISTS WHO, SOME TIME AGO, CAME TO THE CONCLUSION THAT THERE ARE SOME IMPORTANT PROBLEMS IN THIS PARTICULAR AREA THAT NEED TO BE ADDRESSED. THEY ASKED THE U-S ACADEMY OF SCIENCES TO ORGANIZE THE WORKSHOP ON THEIR BEHALF AND WE HAVE DONE SO BRINGING TOGETHER SCIENTISTS FROM THE UNITED STATES AND SCIENTISTS FROM OTHER COUNTRIES WHO CAN ADDRESS THIS ISSUE. WE WOULD ANTICIPATE THAT THE RESULTS OF OUR WORK HERE WILL END UP IN A REPORT THAT WILL GO TO THE SCIENTIFIC COMMUNITY WORLDWIDE AS WELL AS TO VARIOUS GOVERNMENT IN OTHER COUNTRIES. THEY WILL BE USEFUL TO THEM IN THEIR OWN SCIENTIFIC WORK IN THIS FIELD

TAPE: AND WILL STIMULATE THE WORK OF MANY OTHER SCIENTISTS TO  
(CONT) ADDRESS THESE IMPORTANT QUESTIONS."

VOICE: RICHARD VETTER, OF THE U.S. NATIONAL ACADEMY OF SCIENCES,  
ONE OF THE SPONSORS OF THE MIAMI MEETING ON THE ATMOSPHERIC  
POLLUTION OF THE WORLD'S OCEANS.

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(WINTER SHIPPING ON THE GREAT LAKES -- 3-2607 --  
RICHARDS)

EDITOR: YEAR-ROUND SHIPPING ON THE NORTH AMERICAN GREAT LAKES IS NO  
LONGER A FAR-FETCHED DREAM. IN FACT, A UNIVERSITY OF  
MICHIGAN EXPERT SAYS IT IS HERE TO STAY. \_\_\_\_\_ HAS  
DETAILS.

VOICE: THE GREAT LAKES AND THEIR CONNECTING WATERWAYS MAKE UP THE  
MOST IMPORTANT SYSTEM OF INLAND WATER TRANSPORTATION IN THE  
WORLD. ALTHOUGH THIS ENTIRE FRESH WATER SYSTEM DOES NOT  
FREEZE DURING THE WINTER, LARGE BLOCKS OF ICE AND FROZEN  
HARBORS MAKE IT DIFFICULT TO NAVIGATE. SHIPPING HAS ALWAYS  
BEEN HALTED DURING THIS PERIOD.

DURING THE WINTERS OF 1974-1975 HOWEVER, THE LOCKS AT SAULT  
STE. MARIE, BETWEEN LAKES SUPERIOR AND HURON, WERE KEPT OPEN  
FOR SHIPPING.

THIS WAS DONE BY THE WINTER NAVIGATION BOARD, A GROUP  
CONDUCTING A CONTINUING STUDY ON WAYS TO LENGTHEN THE  
NAVIGATING SEASONS ON THE LAKES AND THE CONNECTING SAINT  
LAWRENCE SEAWAY.

VOICE:  
(CONT) HARRY BENFORD, A PROFESSOR OF NAVAL ARCHITECTURE AND MARINE ENGINEERING AT THE UNIVERSITY OF MICHIGAN POINTED OUT SOME OF THE DRAWBACKS, AND BENEFITS, OF WINTER NAVIGATION ON THE GREAT LAKES.

THE MAJOR DISADVANTAGE, HE EXPLAINED, IS THE LARGE COST TO THE PUBLIC OF KEEPING THE SHIPPING LANES OPEN. OTHER PROBLEMS MAY BE POSSIBLE DAMAGE TO THE SHORE STRUCTURE AND THE INCONVENIENCE TO CERTAIN ISLAND COMMUNITIES CAUSED BY BREAKING UP THEIR ICE CROSSINGS TO THE MAINLAND. AND THERE IS THE ENVIRONMENTAL RISK OF THE ICE PUNCTURING THE HULL OF OIL TANKERS, WHICH COULD CAUSE SPILLS. DOCTOR BENFORD ALSO POINTED OUT THAT SHIPS WOULD NEED SOME STRUCTURAL REINFORCEMENT TO CONDUCT WINTER NAVIGATION.

BUT THE PROFESSOR SAID THAT PRELIMINARY STUDIES HAVE SHOWN THAT THE BENEFITS OF WINTER NAVIGATION OUTWEIGH THE COSTS. THE LARGEST ECONOMIC ADVANTAGE IS THE INCREASE IN A SHIP'S ANNUAL PRODUCTIVITY. THIS MEANS THAT CERTAIN FIXED ANNUAL COSTS CAN BE SPREAD OUT, RESULTING IN LOWERED SHIPPING COSTS. WINTER NAVIGATION ALSO MEANS WINTER EMPLOYMENT FOR SHIPBOARD PERSONNEL. AND IT WOULD ELIMINATE THE NEED FOR WINTER STOCKPILING OF MATERIAL.

THE PROSPECT OF YEAR-ROUND SHIPPING ON THE GREAT LAKES IS TEMPTING TO BUSINESSMEN BECAUSE THE AMERICAN MIDWEST IS THE NATION'S LEADING ORIGINATOR AND RECEIVER OF FOREIGN TRADE IN MANUFACTURED GOODS.

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(PIONEER HEADED FOR SATURN -- 3-2607 -- DOSA)

EDITOR: THE PIONEER ELEVEN INTERPLANETARY PROBE HAS SUCCESSFULLY CHANGED ITS COURSE AND IS NOW HEADED FOR A RENDEZVOUS WITH SATURN. HERE IS \_\_\_\_\_ WITH THE STORY.

VOICE: PIONEER ELEVEN LEFT THE UNITED STATES, ON PLANET EARTH, IN EARLY 1973. NEARLY TWO YEARS LATER, IN DECEMBER 1974, IT FLEW BY PLANET JUPITER, MADE VALUABLE SCIENTIFIC MEASUREMENTS AND SENT BACK MAGNIFICENT PHOTOGRAPHS OF THAT ALMOST STAR-LIKE CELESTIAL BODY. THEN, THE SMALL VEHICLE CONTINUED ITS WAY ACROSS THE SOLAR SYSTEM, FOR A SEPTEMBER 1979 RENDEZVOUS WITH BEAUTIFUL SATURN, THE RINGED PLANET.

PIONEER CONTROLLERS AT THE U-S SPACE AGENCY'S AMES RESEARCH CENTER NEAR SAN FRANCISCO, HAVE RECENTLY INCREASED PIONEER'S SIXTY-FIVE-THOUSAND-KILOMETERS-AN-HOUR SPEED BY LITTLE MORE THAN ONE-HUNDRED KILOMETERS AN HOUR. THE SUCCESSFUL MANEUVER WILL LATER ENABLE THE SCIENTISTS TO GUIDE PIONEER ELEVEN EITHER BETWEEN SATURN'S RINGS AND THE PLANET, OR TO COME IN UNDER THE RINGS AND THEN PASS UPWARD OUTSIDE OF THEM.

WHILE THE MANEUVER WAS TAKING PLACE, THE CONTROLLERS HAD TO CUT OFF COMMUNICATIONS FOR SEVERAL HOURS WITH THE SPACECRAFT WHICH WAS THEN FOUR-HUNDRED-SIXTY-TWO-MILLION KILOMETERS FROM EARTH. THIS ALLOWED PIONEER'S ONBOARD CONTROLS TO COMMAND THE VEHICLE TO CHANGE POSITION, TO FIRE ITS SMALL STEERING ROCKETS, AND THEN REPOSITION ITSELF TO POINT ITS ANTENNA BACK AT THE EARTH, IN ORDER TO RESUME COMMUNICATIONS.

VOICE:  
(CONT) SPACE AGENCY OFFICIALS ARE VERY PLEASED WITH PIONEER'S SOLO PERFORMANCE WHILE IT WAS ENTIRELY ON ITS OWN. THE SUCCESS OF THE MANEUVER MAY PERMIT THEM TO GUIDE PIONEER ELEVEN INSIDE SATURN'S RINGS AND TO LET ITS ELECTRONIC EYES TAKE A CLOSE LOOK AT TITAN. TITAN IS THE SIXTH OF SATURN'S TEN KNOWN MOONS, IS LARGER THAN THE PLANET MERCURY AND IS ONE OF THE BEST CANDIDATES IN THE SOLAR SYSTEM FOR THE DEVELOPMENT OF SOME SORT OF LIFE.

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